Original Research Article

Effect of Rice Value Chain Programme on Rice Production in The Gambia

ABSTRACT

This study on the effects of rice value chain programme on rice farmers' production was conducted in the Central River Region of the Gambia. The objective of the study seeks the effect of the rice value chain programme on rice farmers' production in Central River Region of The Gambia. The instruments used for data collection was Focus Group Discussion and In-Depth Interview. The study selected two (2) of the districts from Kuntaur Local Government Area and three (3) from Janjanbureh Local Government Area using purposive sampling technique after which simple random sampling technique was used to select sixteen (16) villages out of which three hundred and eighty-four (384) farmers were randomly selected for the study. The data collected was transcribed for all the focus group and interview comments, the comments were rearranged to have answers which were grouped together for each interview protocol. The findings revealed that, farmers benefitted from the rice value chain programme through interventions such as; available improved seed varieties and fertilizer which have improved rice production. However, challenges still exist in the form of insufficient fertilizer, seeds and market structures. From these findings, it is recommended that Non-Governmental Organizations and investors should supplement government efforts by providing sufficient and quality inputs (seed/fertilizer/machinery) and credit facilities to the rice farmers at a subsidized rate and on time and strengthen the linkages between farmer groups/cooperatives with buyers (Producer-Buyer linkage) for easy market access.

Keywords: Value chain, rice production, The Gambia, accessibility, farmers

1. INTRODUCTION

1.1 Background of the study

Rice (Oryza spp.) belongs to the family of Graminae. It is a cereal grain grown in hot countries providing seeds that are used as food. Rice refers to two grass species (Oryza sativa and Oryza glaberrima) and is native to tropical and subtropical south-eastern Asia and to Africa. The plant measures 2-6 feet tall and has long, flat, pointy leaves and stalk-bearing flowers which produce the grain known as rice. Rice is related to other grass plants such as wheat, oats, and barley which produce grain for food and are known as cereals. Rice is rich in genetic diversity, with thousands of varieties grown throughout the world [1]

Rice is a dietary staple for at least 62.8% of the earth's inhabitant's and accounts for 20% of the caloric intake for the world population. In Asia, it accounts for 29.3% of caloric intake [2]. A Worldwide paddy (unprocessed) rice production averaged about 706.3 million tons during the period 2009/2011 and grew by about 4% to 736.9 million tons in 2012 [3]. In 2012/13 the milled equivalent in a million tons stands at 490.1 and 496.6 in 2013/14; productions have fluctuated in 2014/15 and 2015/16 at 494.3 and 490.3 respectively [3].

It is used in many ways both for food and other purposes. All the parts of rice are of economic importance to man; from rice bran to the grains, leaves, and roots are all of economic value. The grains are quite nutritious when not polished, common or starchy grains are used in various dishes, cakes, soups, pastries, breakfast foods, and starch pastes; glutinous types, containing a sugary material instead of starch, are used in the Orient for special purposes as sweetmeats. Grain is also used to make rice wine, "Saki", much consumed in Japan. In West Africa; countries like Nigeria, Ghana, Senegal, and The Gambia, rice can be prepared in food such as the popular Fried Rice and Jollof Rice. Similarly, in the Senegambia region rice is mixed with groundnut and pounded, then boiled and can also be eaten with sugar and milk. Rice straw is used as cattle feed, used for thatching roofs, filling mattresses, preparation of hats, ropes and as litter material in poultry. The husk is used as animal feed, for paper making and as fuel source. Rice oil is used in soap industry; refined oil can be used as cooling medium like cotton seed oil. Rice bran wax, a byproduct of rice bran is used in industries.

However, global paddy production in 2016 as forecasted by The Food and Agricultural Organization (FAO) reached 751.9 million tons (499.2 million tonnes, milled basis). Based on preliminary prospects for 2017 crops, FAO also forecasts world rice utilization in 2017/18 to expand by an additional 6.2 million tonnes to 506.5 million tonnes.

Rice is currently grown in over a hundred countries that produce more than 715 million tons of paddy rice annually; 480 million tons of milled rice [4]. Fifteen countries account for 90% of the world's rice harvest [5]. China and India alone account for about 50% of the rice grown. Together with Indonesia, Bangladesh, Vietnam, Myanmar, Thailand, the Philippines, Japan, Pakistan, Cambodia, the Republic of Korea, Nepal, and Sri Lanka, Asian countries account for 90% of the world's total rice production [5].

Total rice consumption worldwide for 2008/09 season amounted to about 437,179 Million Metric Tons (MMT) on average (UNIDO). However, there is annual increase in global rice consumption of 437,179 in 2008/09 to 475,637 MMT in 2016/17 season. Similarly, FAO reported that world rice utilization in 2016/17 amounted to 500.3 million tonnes (milled basis), up 1.0 percent year on- year and little changed from December expectations, World rice utilization in 2017/18 to expand by an additional 6.2 million tonnes to 506.5 million tonnes. Consumption of rice as food is again expected to sustain most of this growth, reaching 406.4 million tonnes [3].

Africa produces an average of 14.6 MMT of rough rice per year (1989-1996) on 7.3 million hectares, equivalent to 2.6 and 4.6 percent of the world's total production and rice areas, respectively. In 2001-05, rice production has been expanding at the rate of 6% per annum, with 70% of the production increase due mainly to land expansion and only 30% being attributed to an increase in productivity [6][7]. African paddy production neared the 30.0-million-ton mark in 2016, sustained by gains in Egypt and West Africa [3] compared to 26.0 million in 2012.

However, Africa consumes about 11.6 million tonnes of milled rice per year [8] of which 3.3 million tonnes (33.6 percent) is imported. About 21 of the 39 rice-producing countries in Africa import between 50 and 99 percent of their rice to supplement their annual rice requirements. The distribution of rice importation on a regional basis appears skewed, with the North and Central Africa regions setting the lower (1.7 percent) and upper (71.7 percent) limits. The average consumption of rice in Africa for 2014 to 2016 amounted to 32, 118 MMT [3].

Rice production in Sub-Saharan Africa (SSA) is dominated by subsistence, smallholder farmers who have limited access to markets, no equipment other than hand-held tools and limited use of inputs. The average rice yield in the sub-continent is the lowest in the world - 1.4 tonnes per hectare compared to Asia's average of 4 tonnes (more than 6 tonnes in China).

Similarly, growth of rice consumption in SSA has been outstripping that of rice production. Between 1961 and 2005, rice consumption in SSA grew at 4.52% annually, compared with growth in production of 3.23% [9]. Imports increased dramatically to fill the gap, as the self-sufficiency ratio (production/consumption) declined from 112% in 2008 to 60% in 2015. The international market thus supplied 40% of SSA's rice needs, and this share is continuingly increasing.

The West African sub-region is regarded as the biggest rice market in SSA, accounting for two-thirds of the region's rice demand with 50% imports, which represents about 20% of the total volume of rice traded globally [10]. In May 2008, world rice prices tripled in just a few months to reach 30-year, inflation adjusted highs. As reported by [11], the total value of rice imports by West African countries alone is estimated at US$1.4 billion per year. According to Country data from the Permanent Interstate Committee for Drought Control in the Sahel (CILSS) meeting and FAS Dakar estimates that rice production has increased in West Africa over the last three years, i.e. 5,100 Million Metric Tons (MMT), 5,978MMT and 6,425 MMT for 2015, 2016 and 2017 respectively. It was also observed that the amount of rice consumed during the same period also increased from 8,714 MMT for 2015 to 9,573 MMT for 2016 and 10, 172 MMT for 2017. All the countries combined intend to import 3.8 million tons in May 2015/16, an 8 percent increase compared to the previous year.

In the Gambia, rice has long been an important food grain and is traditionally cultivated both in upland areas and in the seasonally flooded swamps, which lie adjacent to the river Gambia and its tributaries. Rice production in the country fails to match demand and only some 40-50% of total rice consumption originates from local production, with the balance made up from imports (The National Planning Services Unit [PSU,2013], National Agricultural Sample Survey (NASS)

2013) in [12] revealed that the annual rice imports 2012-2013 rose to 137,000 metric ton and annual consumption in rice was 178,822. In 2014 the country imported 140,000 tons to cover the production deficit (world-grain.com 2017). Thus, the implementation of rice value chain programmes and strategies to combat the importation of rice, the declining yields and the poor living conditions of farmers was necessary.

A value chain is the full range of activities required to bring a product from conception, through the different phases of production and transformation. A value chain is made up of a series of actors (or stakeholders) from input suppliers, producers and processors, to exporters and buyers engaged in the activities required to bring an agricultural product from its conception to its end use [13]. The value chain concept entails the addition of value as the product progresses from input suppliers to producers to consumers. A value chain, therefore, incorporates productive transformation and value addition at each stage of the value chain. At each stage in the value chain, the product changes hands through chain actors, transaction costs are incurred, and generally, some form of value is added. Value addition results from diverse activities including bulking, cleaning, grading, and packaging, transporting, storing and processing [14].

Rice value chain describes the roles and relationships of the various actors within and along the chain, and how they are linked to existing market system. It also describes the flows of the rice commodity and value-adding activities between the different actors of value chain to the end users. The rice value chain is also an intrinsic network of public and private interactions and responsibilities. The public responsibilities are often in infrastructure (roads and irrigation), policies and regulations (seed laws, use of inputs, export policies, tax incentives, etc.), research and development (variety selection, etc.) and agricultural extension. Nico and Rajam, (2012) as cited in [12] opined that the private responsibilities are concentrated along the supply chain from provision of inputs through production to processing and trade

Value Chains are found at the core of high impact and sustainable initiatives focused on improving productivity. Focus has shifted from agricultural production to consumer demand, marketing and the coordination of product flows from producers to consumers. The Value Chain concept acknowledges that production must be linked to demand and the critical role of organizing the flow from farmer to consumer opportunities Ngambeki et al., (2010) in [12].

Due to the rice development potentials of the Gambia, the government in 1951 adopted and pursued a policy of rice self-sufficiency and rice value chain programmes and subsequently implemented two projects, namely; (Taiwanese-Gambian Technical Assistance Agreement in 1966 and the International Bank for Reconstruction and Development – International Development Agency (IBRD-IDA). The government of the Gambia aimed at increasing production of rice to curb the increasing importation of rice annually, attain food security and improve the livelihood of the rice farmers. Similarly, introducing irrigated rice production in the swamp lowlands on the levee of the river has been one of the most explicit strategies to increase food production and by this, solving the self-sufficiency problem in The Gambia [15].

1.2 Statement of the Research Problem

Rice is one of the most important food crops in Africa, where rice and the economic activities are related to its production, processing, distribution, and consumption are widely considered a key for economic development, food security, and poverty reduction. During the past three decades the crop has seen consistent increases in demand and its growing importance is evident in the strategic food security planning policies of many countries. In the Gambia, rice is the main staple crop for the country and has one of the highest per capital consumption rates of 117 kg in the world. Consumption of rice for 2015/2016 stands at 190 MMT and 215 MMT in 2017/2018 periods.

Irrigated rice production has received more assistance and development-oriented interventions from government, non-governmental organizations and donors than any other food or cash crop production system in The Gambia. Support to rice production and the ambition to decrease import dependence go back to the early 1950s when the Colonial Development Corporation introduced irrigated rice cultivation with water control into the Gambian farming system. These schemes aimed at creating surpluses for meeting domestic demand and strengthening household food security. Challenges in irrigation schemes were met with high investment and production costs, imposing rigid production systems on farmers who were traditionally following a seasonal farming pattern.

Despite the recent success in raising local rice production through the introduction of 'Nerica' varieties, there remains some doubts about the future of this growth trend as so far, all efforts to boost domestic rice production have been unsuccessful and short lived. Yields in rice farming remain low, at the level of coarse grains, despite the introduction of 'Nerica' and production increases have been based on increased area farmed. In fact, price competitiveness of local rice versus imported rice remains a major question concerning the future of local rice marketing in The Gambia. While at a small-scale local rice marketed by individual farmers seems to be able to compete with imported rice on rural markets, it is less clear whether the processing and marketing of local rice at a larger scale, i.e. grouped sales by a farmers' association would be competitive.

Similarly, several studies on rice production have been carried out in the Gambia for example [16], wrote on Management of Rice Production Systems to Increase Productivity in The Gambia, West Africa, while [17], wrote on Rice Production in The Gambia: Role and Needs of Women Rice Farmers in the CRR.

Therefore, this study has become inevitable due to the fact that literature exist on rice production in the Gambia but I have not come across any on the effects of Rice Value Chain Programme on production in the Central River Region of the Gambia. The paper answers the question of what are the effects of Rice Value Chain Programme on the rice production

in the Gambia? The objective of this paper is to assess the effects of Rice Value Chain Programme on rice production in the Gambia. Thus, a well-designed rice value chain programme can help in increasing rice production in The Gambia. A well-designed rice value chain programme can help in increasing rice production in The Gambia.

1.3 Significance of the Study

Value addition to most food products like rice is not limited to processing only, but also by storing (value increasing over time) and transporting it (value increasing over space). The main reason for a Value Chain is to efficiently capture value in end markets to generate higher profits and create mutually acceptable outcomes for all parties involved in the chain process from production to consumption and disposal. However, there exist little information on the effects of Rice Value Programmes on rice production in the Gambia, this leads to assumptions that an increase in yields also leads to an increase in income and improvement of the farmers' livelihood. The research will be relevant to the rice value chain projects by highlighting the problems the rice farmers and other value chain actors' encounter in implementing the programme and this will help them to design and implement impact-oriented programmes that can tackle the findings of the study and thus increase rice production. The findings from the study will also enable government and its donor partners to invest on issues that are impeding the increase on rice production and other stakeholders like the National Research Institute (NARI) and National Seeds Secretariat will also be able to focus their efforts of providing seed varieties that are of consumer preference.

The study focuses on the effects of rice value chain programme on rice production in Central River region of the Gambia. The study covers from 2014 to 2018 (the period covered is from the beginning of the recent rice value chain programme) and covers the Central River Region of the Gambia**.**

1.2 Objective of the Study

The study aims to; examine the effects of rice value chain programme interventions (provision of seeds and fertilizer) on rice production (yield) in Central River Region (CRR) of the Gambia.

2. MATERIAL AND METHODS

2.1 Study area

The study was conducted in Central River Region North/South (CRR N/S) of the Gambia. Central River Region was the largest of the five administrative divisions of the Gambia until it was divided into Central River Region/ North and South to form six administrative regions [18]. The area of study is located on both sides of the Gambia River with 13034'N 14047'W, as coordinates, it comprises eleven (11) districts: five (5) districts in the north with its headquarters in Kuntaur;

Lower Saloum, Niani, Nianija, Sami and Upper Saloum and six (6) districts in the South with its headquarters in Janjanbureh; the six districts are Janjanbureh, Lower Fuladu West, Upper Fuladu West, Niamina East, Niamina West, Niamina Dankunku. The region has a total land area of 2,894.25 and a total population of 226, 018 at a population density of 156.5 and 20, 559 households (Statistical Abstract, 2017) of which about 80% are agrarian.

2.2 Population of the Study

The target population in the study is stakeholders in Rice Value Chain and the rice farmers. The total population for the study is 9,341. This includes nine thousand two hundred and seventeen (9,217) registered rice farmers, two (2) extension agents one for each of the Local Government Area, and two (2) agricultural officials, two value chain project staff, two (2) research institute officials, two (2) investors and eight (8) input dealers, four (4) processors, four (4) rice traders and 100 (100) rice consumers both males and females from Central River Region N/South of the Gambia.

2.3 Sampling Technique

Central River Region is divided into eleven (11) districts. Under Kuntaur Local Government Area (LGA) there are five (5) districts namely: Lower Saloum, Upper Saloum, Niani, Nianija and Sami districts and in Janjanbureh Local Government Area there are six (6) districts; Niamina Dankunku, Niamina West, Niamina East, Lower Fuladu West, Upper Fuladu West and Janjanbureh. The study selected two (2) of the districts from Kuntaur Local Government Area and three (3) from Janjanbureh Local Government Area using purposive sampling technique. The choice of the districts was due to the high production of rice and the intervention of Rice Value Chain Programme in the area. The selected districts were Niani and Sami of Kuntaur LGA, Niamina East, Niamina Dankunku and Lower Fuladu West of Janjanbureh LGA. The five (5) districts are all made up of villages; three (3) villages were selected in each of the districts using simple random sampling. The names of the villages in each of the districts were placed in a hat and a lucky dip was done, the names of the villages drawn from the hat were used for the study. This brought the total number of villages selected for the study to be fifteen (15). For the selection of respondents, the sample size of farmers was determined by using Yamane (1967) formula as cited in [12] for calculation of sample size using the number of registered rice farmers in Central River Region as provided by the Registry of the Agribusiness Service as 9,217. Thus:

$n= N/1+N (e^2)$

Where;

n = sample size of the study

N= population of the farmers in the study area

e= Margin of error = 0.05

Therefore, sample size = $9217/1+9217 (0.05)^2$

Therefore, sample size = 9217/1+23.04

= 383.64

= **384**

The equation shows that 384 rice farmers will be used for the study. In order to determine the farmer respondents per village, the proportional sampling technique was used. The number of respondents per village was determined as:

p/qxr

Where:

p = half of the calculated sample size (192)

q = the calculated sample size (384)

r = total number of members of the registered rice farmers to be surveyed

Table 1 shows the number of respondents across selected villages in the study area.

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Table 1: Number of respondents from each village

No	Name of village	Population of registered farmers	Calculation of the number of respondents per village	Number of respondents
1.	Barajally Suba	48	p = (192/384 x 48)	24
2.	Kuntaur Fula Kunda	100	p = (192/384 x 100)	50
3.	Wassu	110	p = (192/384 x 110)	55
4.	Jarumeh koto	82	p = (192/384 x 82)	41
5.	Manna	30	p = (192/384 x 30)	15
6.	Koli Kunda	14	p = (192/384 x 14)	7
7.	Kununku	10	p = (192/384 x 10)	5
8.	Touba Demba Sama	12	p = (192/384 x 12)	6
9.	Kudang	40	p = (192/384 x 40)	20
10.	Madina Umfally	90	p = (192/384 x 90)	45
11.	Pachari	92	p = (192/384 x 92)	46
12.	Jahally	80	p = (192/384 x 80)	40
13.	Barrow Kunda	10	p = (192/384 x 10)	5
14.	Dankunku	40	p = (192/384 x 40)	20
15.	Jakoto	10	p = (192/384 x 10)	5

Total	**15**	**384**	**384**

Source: Field Survey, 2021

2.4 Sampling Procedure

The number of the farmer respondents from each village is shown as in table 1 above. These respondents were selected using purposive sampling. The sample for a focus group will have individuals with general characteristics of the overall population and can contribute to helping the research gain a greater understanding of the effects of rice value chain programme on rice farmers' production.

Using the number of respondents generate from the sample size calculation formula per village, the number of focus groups were determined as shown in table 1. A total number of forty-two (42) Focus Group Discussions (FGD) were held which took 6 weeks to accomplish. The number of respondents for each FDG was between 5-10 respondents per group. The groups were formed according to age brackets; 18-35 and 37 and above, this grouping was done where there are more than one FDG. In villages were one FGD was conducted, the groups consisted of all age brackets.

Purposive Sampling Procedure was used in selecting one (1) extension agent (focal point) for Local Government Area. This brought the total to two (2) agricultural extension agents. Two (2) government officials were selected; from the Ministry and Department of Agriculture, Two (2) Rice Value Chain Project officials, two (2) researchers were selected from the research institutes; two (2) main investors were selected and eight (8) input dealers; machinery/equipment, seed suppliers, pesticides and herbicides suppliers, fertilizer suppliers (2 from each LGA), four (4) processors two (2) from each of the LGA), four (4) rice traders [two [2] from each of the LGA] and a hundred (100) rice consumers across the country. The total sample size for the survey is 511 rice farmers and key informants.

2.5 Data collection

2.5.1 Focus Group Discussion (FDG)

Focus group interviews with rice farmers at district level were held to collect primary information. Checklists for discussion was developed and used to facilitate the focus grouped interview. The number of respondents for each FGD was between 6-10 per group, this is based on the number of respondents calculated per village, as the lowest village has five (5) discussants and the highest is seventy-one (71), thus the smallest group consisted of five (5) discussants and the highest ten (10) for easier coordination and control of the FGD. In a village where there is more than one group, then the groups were composed based on gender and age brackets (the discussants were grouped within 18-35 in one group and 36 and above in another group, this was done to allow the younger participants (to contribute more freely) to provide variety of responses. The total number of FGD's held was 42 which took 6 weeks to complete.

2.5.2 Key informant Interview

Key informants (knowledgeable observers of the sub-sector) were also identified and interviewed in order to obtain their views, opinions and suggestions about constraints and opportunities. The key informants interviewed include: Government Officials, Agricultural Extension Agents, researchers, investors, input suppliers' processors, rice traders and rice consumers.

2.6 Techniques of Data Analysis

The data collected was transcribed for all the focus group comments, the comments were rearranged to have answers grouped together for each interview protocol. The main ideas were organized into themes to generate an idea or ideas and quotations were identified for each theme. The findings were written in narrative to describe the themes with quotations. Regarding the quantitative analysis, simple descriptive statistics including frequency and percentages was used for the surveyed data collected from the rice farmers and key informants. Statistical Package for Social Science (SPSS) version 20.0) was also employed to analyze the data from the socio-demographic characteristics of respondents and on the inputs received from the rice value chain programme and yield from the rice fields. The data analyzed were also tabulated to highlight the frequency and percentage.

2.7 Limitations of the study

The major challenged encountered during the study was translating the FGD guide from English to the local languages. This was time consuming and delayed the group discussions

Another constraint was the timing of the study. The best time and place to reach out to farmers was in their homes and this proved difficult are some farmers where either in their fields or at the market.

3. RESULTS AND DISCUSSION

This chapter presented the data collected in the field, it also discussed and analyzed findings in relation to the study objectives; the nature of the rice value chain programme, the experiences of farmers under the rice value chain programme, the effects of rice value chain programme on rice farmers production, and the challenges faced by farmers under the rice value chain programme.

3.1 Bio-Data of Respondents

Table 2 Socio-Characteristics of Respondents

Attributes of Respondents		**Frequency (384)**
Gender	Male	171
	Female	213

Age	17-27	39
	28-38	98
	39-49	89
	50 Above	158
Educational Level	Non-Formal	311
	Primary	41
	Secondary	29
	Tertiary	3
Land Ownership	Rented	48
	Self-Owned/Communal	336
Area Cultivated	Less Than 0.5ha	101
	0.5ha-1ha	206
	1ha Above	77
Farmer Organization	Non-Member	77
	Member	307
Sources of Labour	Family	296
	Hired	43
	Both	45

Source: Field survey, 2021

Table 2 highlighted the socio-demographic characteristics of 384 respondents in the study area. The table showed that there are (171) males and (212) females, which showed that the population of female respondents was higher than that of the male; a clear manifestation that the women are more active in rice farming than their male counterparts, thus, contributed more to the Gross Domestic Production (GDP) in terms of rice production.

The age distribution of respondents indicated that majority (158) of rice farmers in Central River Region of the Gambia are between the ages of 50 and above. As shown in table 2, 247 of farmers fall between the ranges of 40-75years. Only 137 were aged between 17-39 years old. It indicated that there is a low level of youth participation in rice production in Central River Region of the Gambia, thus, leaving the aged and feeble to handle the tedious and laborious farming operations. This finding is similar to that of [12].

Due to the low returns from rice farming and poor decentralization policies in terms of development, the youths, who

constitute about 65% of the Gambian population, prefer to migrate to urban centers in search of white-collar jobs or to Europe through the Mediterranean Sea. The implications of the age category of 40 years and above being more involved in rice farming may contribute the low levels of production in the study area.

Table 2 showed the educational level of respondents. It showed that (311) had non-formal education, while only 41 received primary education, 29 and 3 received secondary and tertiary education respectively. The level of illiteracy among the respondents was high. The implication of a high illiteracy rate among farmers is that they will find it difficult to read written instructions and apply them to increase rice productivity. Furthermore, only two respondents had a tertiary education, demonstrating that most of the highly educated populace did not actively engage in rice farming. Those with higher education would have been in the position to operate farming machinery, timely application of fertilizer and conducting good agricultural practices to increase production in the study area. Furthermore, farmers' lack of literacy prevented them from developing effective negotiating skills or using modern communication technologies for price information to support commercial decision-making.

Table 2 further showed that 336 of respondents own their own land or through communal system, where the village head called "Alkalo" shared the farmlands among households according to family sizes. Only 48 of respondents said they rented their rice filed plots for the 2018 farming season. The land owners at times were ready to rent out their lands to other farmers or outsiders for a season or two. Some land owners will not rent out their fields nor allow others to work on them allowing the field uncultivated for that season or the next, either as a result of not having the required inputs or sufficient farm labour.

In addition, the majority of the respondents in the study area 206 cultivated on plots ranging from 0.5-1 hectares, followed by 101 of respondents who on plots which were less than 0.5hectares. Others 77 farm on plots which were more than 1hectares. This indicated that majority of farmers were small scale farmers who were limited to little or no credit facilities and donor assistance which would have enabled them to have access to improved seed varieties, fertilizer, pesticides and machinery, thus, leading to the rice farmers producing only for consumption with little or none to sell. This is similar to a national survey of the Cambodia Development Resource Institute (CDRI 2008), which revealed that only 35% of Cambodian farm households produce a paddy rice surplus and the rest produce less than enough for consumption needs or just a sufficient amount.

In terms of membership of farmers' organization (Kafoo), 307 of the respondents have acknowledged being a member of a farmer group (Kafoo). The evidence of farmer organizations in the region highlights the level of preparedness by farmers to work with the government, donor agents and Rice Value Chain Projects in increasing productivity. Farmers in organization readily receive from the rice value chain programme assistance such as improved seed varieties, fertilizer,

machinery and credit. However, farmer organizations are constrained by over-involvement of the Government and the failure to transform these farmer groups into producer cooperatives to increase production.

The study shows that 296 of respondents reported to have acquired family labour as their main source of labour from family members and relatives, while 43 of respondents stated that they utilize hired labour. 45 used both family and hired labour for their farming operations. Tedious and laborious task such as tillage and transplanting, they hire tractors or power tillers to do the work and other operations such as weeding, fertilizer application, harvesting and threshing are done by family members. Family labour is more reliable than hired labour, this is as a result of inadequate machinery for hire and even after hiring of a tractor or power tiller for tillage or ploughing the machine can breakdown leaving the farmer with days or weeks of waiting before the machine is repaired. On the other hand, family labour takes a longer time to complete, as such can delay all other farm operations.

Effects of Rice Value Chain Programme on Rice Production

The benefits of rice value chain programme on rice production as highlighted by the farmers includes; increased in improved seeds, fertilizer, rehabilitation of rice fields and increase in plots for farming leads to an increase in production and yield. The table below highlights some of these benefits enjoy by the farmers.

Table 3: Benefits of rice value chain programme on rice farmers' production

		Before RVC	During RVC	Difference	t-test
Seed quantity per plot	**Quantity (kg)**	**Frequency (384)**	**Frequency (384)**		0.000
	<20	68	5	63	
	21-40	316	84	232	
	41-60	0	295	0	
Fertilizer quantity per plot	**Quantity (kg)**				0.000
	0	79	0	0	
	< 10	2	0	0	
	10-14	131	46	85	
	15-19	138	96	42	
	20-25	34	23	11	
	26 >	0	219	0	
Yield per plot	**Quantity (kg)**				0.000
	0	26	0	0	

	<500	124	30	94
	500-1500	203	130	73
	1501-3000	7	188	181
	3001-4500	23	8	15
	4501-6000	0	27	0

Source: Field Survey 2019

The findings from table 2 highlighted that there has been an increase in production in the study area as result of the Rice Value Chain programme interventions. Prior to projects intervention, the data obtained in the table above indicates that majority (316) of the respondents had seeds for planting between 21-40kg, while some (68) had less than 20kg. However, after the interventions, majority (295) of the respondents had between 41-60kg of seeds for planting, 84 had between 21-40kg, while only a few (5) had less than 20kg. The t-test analysis conducted between seed quantity per plot before the Rice Value Chain Programme interventions and after the interventions indicated a P Value = 0.000, Since P value is less than 0.05 (alpha level), it means that there is a significant change in availability of seeds for planting. This implies that farmers had more seeds to plant after the interventions of the Rice Value Chain Programme. The increase in rice production in the study area can be attributed to the availability of more seeds for planting.

The data obtained in the table above also highlights that, 79 respondents do not have access to fertilizer for their rice production before the interventions of the Rice Value Chain Programme, 2 respondents had less than 10kg, 131 of the respondents had between 10-14kg, while 138 of them had between 15-19kg and 34 had between 20-25kg. In contrast majority (219) of the respondents after the Rice Value Chain Programme interventions had access to more than 26kg of fertilizer for their rice production, 96 of them had between 15-19kg, 46 of the respondents also had between 10-14kg and 23 of the respondents had between 20-25kg of fertilizer. This implies that during the Rice Value Chain Programme interventions, all farmers in the study area had access to fertilizer than before the programme interventions. The t-test analysis conducted between fertilizer quantity per plot before the Rice Value Chain Programme interventions and after the interventions also indicated a P-Value = 0.000, Since P- value is less than 0.05 (alpha level), it means that there is a significant change. It also implies that farmers have more access to fertilizer which could have been a factor contributing to the increase in rice production.

The data obtained in the table above shows that before Rice Value Chain Programme interventions, 26 of respondents had no yield because they were not able to farm in their fields, either as a result of salt intrusion, no fields for production due to blocked canals or flood. 124 of the respondents had a yield less than 500kg, 203 reported that they had a yield between 500-1500kg, while 7 stated that they had a yield within the range of 1501-3000kg of rice, the highest yield

obtained before the Rice Value Chain interventions is reported by 23 of the respondents to be between 3001-4500kg. During the Rice Value Chain interventions, the data obtained shows an increase in more respondents (188) have a yield within the range of 15001-3000kg, 130 of the respondents also posited that they had a harvest between 500-1500kg, 30 respondents had less than 500kg, while 23 of them had between 3001-4500kg and a few respondents had yields as high as 45001-6000kg of rice. The increase in yield after the interventions can be attributed to Rice Value Chain Programme providing inputs, free ploughing and rehabilitation of tidal irrigation schemes. In the same vein, a t-test analysis conducted indicates that there is a significant change in the yield acquired famers after the Rice Value Chain Programme compared to before the interventions. The data shows a P-Value = 0.000, Since P- value is less than 0.05 (alpha level), it means that there is a significant change in yield before and after the Rice Value Chain Programme interventions. This was stated by one of the discussants as thus:

> Although the fertilizer we received is not enough, it has helped in increasing our yield. When you have enough water in the fields, quality seeds and fertilizer, what do you expect, good yield…? I use to have 9 bags (450kg) per plot now am having 12-14bags (600-700kg) in the same plots (A 45-Year-Old Female Rice Farmer/Kuntaur Fula Kunda/Niani District, 2019).

Another discussant stated thus:

> After the fields were rehabilitated and NeMa project provided us with free ploughing, rice seeds varieties, fertilizer and cleared the rice field belt to control quelea birds I experienced an increase from 70 bags (3500kg) to 90 bags (4500kg) in my 0.5ha plot (A 40-Year-Old Male Rice Farmer/Pachari/Lower Fuladu West District, 2019)

The finding above is in line with key informant report, they stated that rice production and productivity rose from 2.0Mts/ha in 2016 to 5.09Mts/ha in 2017. Similarly, another informant stated that;

> Total rice production i.e., 24,597.85 metric tons realized during the 2017 dry season rice production was higher than the project target of (22,000) metric tons by 111% (Monitoring and Evaluation Officer, Central Project Coordination Unit/Banjul/July, 2019).

The findings above are also consistent with [19] reported that; Rice Value Chain Initiative in Benue/Kwara States of Nigeria have induced an increase from an initial of 1,000 rice farmers to 9000 rice farmers which boosted up production from an average yield per hectare farmers to 4.25Mt/ha from an initial 1.25 average for the country from 2005-2010".

The findings highlighted that there has been an increase in income of farmers due to the interventions of RVC programme. During off-peak selling periods of rice, farmers can earn as much as D1, 000 per bag of rice. Some families

own up to about 5-10 plots for rice cultivation and an increase yield relatively translate to an increase to income and many farmers are able to provide better living standards for their families.

> We are benefitting from the RVC value chain programme, from the sales I made from my rice produce last year, I was able to pay for all my children's' school fees and was able to hire a power tiller for tillage (A 60-Year-Old Male Rice Framer/Kudang/Niamina District, 2019).

The finding above is in line with a key informant report which stated thus:

> From the cumulative quantity of rice produced (25,132.95mts) in the two regions, a total of 6,534. 47 Metric tons was sold accounting for 26% with CRR/south recording the highest tonnage marketed i.e., 6385. 85 metric tons sold whilst the total volume marketed in CRR/North was only 149.1 metric tons. (Monitoring and Evaluation Officer, NeMa Project/Abuko/July, 2019)

This finding is also in line with [20], who reported that "Input intensification associated with yield growth results in greater demand for labour and wages, which contributes to increase farm income".

The finding from the study indicated that female rice farmers' participation is increasing and the RVC programme advocates for women participation. Most of the farmer organizations formed is mainly women as they aim to improve their livelihoods. This was indicated in one of the FGD sessions as thus:

> Most of the farmers in the rice fields are females and we organize ourselves in to Kafoo's (farmer organization) to gain support from the government and projects and we also levy ourselves a certain amount of our produce, this helps us to purchase inputs and also give credit to our members. We have just a few of our husbands in the Kafoo's and they help us in laborious jobs like tillage and lifting the produce from the farm to the home (A 28-Year-old Female Rice Farmer/Jarumeh Koto/Niani District, 2019)

This finding is consistent with the key informant report which stated that:

> Majority of Rice Value Chain programme target beneficiaries are women, particularly the vulnerable rural women that are engaged in rice and vegetable production… in rice production, about 631 (444 females & 187 male from CRR/South and 320 (67 females & 253 males) from CRR/North are participating actively in rice production (Monitoring and Evaluation Officer, NeMa Project/Abuko/July, 2019)

This implied that women are the main beneficiaries under the rice value chain programme and thus is consistent with [21], who stated, "Women's contribution in rice farming is steadily growing due to accelerated rate of male migration".

4. CONCLUSION

From the research findings, it was concluded that the rice value chain programme in the Gambia have positive effects on rice production. The effects of the rice value chain programme on rice production according to findings range from availability of inputs (fertilizer, improved seeds, tillage implements and machinery; tractors and power tillers) processing (threshing and milling machines), rehabilitation of rice fields that caused an increase in production.

In that vein, the government of the Gambia in its endeavors to increase production and thus reduce importation of rice has engaged in implementing policies and strategies to this effect. Projects have also drawn up strategies to rehabilitate key irrigation infrastructures which could be attributed to the increase in production and organized forum between the rice importers and rice producers to discuss and bring a solution to the marketing price.

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